

November 2025

6th Edition

SWR

Magazine 1:1

ISSN: 3068-7233

CQWW SSB

THE ECHO THAT
CONNECTS THE
WORLD

FROM THE WORKSHOP

HOW TO BUILD A 4:1
BALUN STEP BY
STEP

Radio Astronomy as a Hobby

LISTENING TO THE
UNIVERSE FROM HOME

THE NEW PARADIGM IN SDR

ANAN-G2 ULTRA
HF & 6M 100 W

THE ERA OF SMART RADIOS

WHEN ARTIFICIAL
INTELLIGENCE MEETS HF
COMMUNICATIONS

Introduction

On the Cover

On our cover this month, an image that captures the very essence of amateur radio: a ham operator guiding a group of Scouts during the Jamboree On The Air (JOTA), held last October. The photograph shows more than just cables, microphones, and antennas; it conveys the sharing of knowledge, the excitement of a first contact, and the magic that happens when one generation paves the way for the next.

JOTA is a tradition that brings together thousands of young Scouts and radio operators around the world, demonstrating that radio remains a vibrant, human, and universal medium. Behind every “CQ” call lies curiosity, learning, and friendship. That first “hello” over the airwaves can inspire future vocations, build cultural bridges, and

Every call we teach is a spark that will ignite new voices on the air... and new generations of amateur radio operators around the world.

remind us all that—even in the era of digital connectivity—nothing compares to the thrill of hearing a voice arrive from afar.

Our cover feature, Rafael Bonano KP3V, embodies the spirit of service and mentorship that has sustained amateur radio for over a century. His attentive gaze, as he explains how to make a contact, reflects the dedication of those who keep alive the flame of learning, experimentation, and camaraderie.

This image not only celebrates an annual event but also a legacy that is renewed every time a young person hears their first signal and realizes that, with an antenna and a little curiosity, the entire world is within the reach of their voice.



Photo by: Radio Opetradores del Este. KP3RE

Content

Every signal we send is a bridge to someone, a reminder that connection always finds its way.

Section 1

Editorial	04
World News	05
CQWW SSB	06
From the Workshop	09

Section 2

DXpeditions	12
Earth-based support	14
ANAN-G2 Ultra	17
The Lost Art of CW	21
Radio Frequency and Telemetry	23

Section 3

The Era of Smart Radios	28
Propagation Tools	31
Homemade Delta Loop for 6 Meters	35
Short Antennas, Strong Signals!	43
Radio Astronomy as a Hobby	46
Mailing Address:	
C33 Extensión del Carmen	
Camuy, Puerto Rico 00627	

Tel: (787) 649-8541

Email: caribbean.crg@gmail.com





Photo by: hoosierenergy.com

Editor: José M. Candelaria NP4ET
 Technical Editor: Juan Montijo WP4OV

Contributors:

Erika Isabel Natarajan HJ1ISI
 Julio Mercado WP4PUX
 Ricardo Cortés HK3CCR
 Israel Cabrera KP4AX
 Abimael Padro KP4RY
 Radio Club Los Molinos de Villa Alemana

There is something magical about hearing the soft murmur of background noise on the bands... that silence full of promise. On every frequency, in every signal that crosses the ether, resonates the story of those of us who still believe that radio is more than a hobby: it's a way of life. With this sixth edition of SWR, we celebrate that invisible connection that unites amateur radio operators across every corner of the globe. We are part of a community that continues to grow, learn, and dream with every QSO, with every project born in the workshop, with every new challenge on the air. Within these pages, we invite you to travel among soldering irons and coils with a step-by-step guide to building a 4:1 balun, to rediscover the thrill of competition through the experiences of CQWW, and to look skyward to trace the elegant shape of

a delta loop antenna in the wind. We also explore cutting-edge technology with the impressive ANAN-G2 Ultra HF & 6M, a glimpse of a future that is already here. But beyond the equipment and techniques, this edition celebrates the spirit that drives us: curiosity, camaraderie, and the desire to experiment and share. Every reader, every operator, every station on the world map is part of this symphony of voices traveling without borders.

So tune your dial, pour a cup of coffee, and settle in front of your rig. SWR #6 is ready to bring you the energy, nostalgia, and inspiration of those of us who keep looking to the horizon... searching for that next signal that reminds us why we love this hobby so much.

73 and happy reading,
 The SWR Editorial Team

Subscribe Completely Free:

<https://forms.gle/DDhwNTQpFdpdWBZ87>



Photo by: swinginwest.com





WORLD NEWS

FCC PLANS TO REMOVE OBSOLETE PART 97 RULES

The FCC plans to remove or modify four minor provisions of Part 97 as part of a review eliminating obsolete regulations, without affecting the Amateur Radio Service, according to the ARRL.

The changes include:

- § 97.27 – Removal of the provision on license modification, already covered by the Communications Act.
- § 97.29 – Removal of the paper license replacement procedure, as paper licenses have not been issued since 2020.
- § 97.315(b)(2) – Elimination of the exemption for HF amplifiers acquired before 1978, a rule that is no longer applicable.
- § 97.521(b) and Appendix 2 – Removal of VEC region regulations, now irrelevant due to remote examinations.

These changes will take effect 60 days after their publication in the Federal Register, unless significant comments require further review. The ARRL will continue working with the FCC to protect and promote amateur radio.

Source: ARRL.

AMSAT CHARTS ITS COURSE TOWARD THE FUTURE



By Mark Johns, KØJM – ANS News Service

During the AMSAT Annual General Meeting held in Phoenix, Arizona, newly elected president Drew Glasbrenner, KO4MA, presented the key goals that will shape the organization's future. Among his proposals is a dual focus: reducing costs and increasing membership.

Glasbrenner highlighted progress achieved with an all-volunteer administration and the transition of AMSAT Journal to a digital format. He also announced free student memberships and the reactivation of youth activities such as University Satellite Night and the AMSAT Youth Network.

In response to the discontinuation of the government CubeSat Launch Initiative (CSLI), AMSAT plans to fund commercial launches for the upcoming GOLF-Tee and Fox Plus satellites. The development of modular payloads that can be integrated into other satellites is also a priority, following the example of the successful Greencube IO-117. Finally, Glasbrenner emphasized the need to strengthen international collaboration and establish solid strategic planning to address the challenges of future orbital missions.

(Photo Credit: David Vine, WA1EAW – AMSAT Director of Public Relations)

WW DX CONTEST

SSB



Photo by: DXZONE

CQWW SSB: THE ECHO THAT CONNECTS THE WORLD

By: SWR Editorial Team

There is something magical in the air when the last weekend of October arrives.

The bands begin to fill with voices crossing oceans and mountain ranges; dials light up with flashes of energy, and in every shack, the same thrill awakens that we felt the first time we turned a dial and heard, amid the noise, a distant signal.

It is the CQ World Wide SSB Contest, the great annual gathering that turns amateur radio into a planetary symphony.

For 48 hours, thousands of operators—from modest urban balcony stations to powerful towers on remote mountains—raise antennas, adjust microphones, and call out to the world: “CQ Contest... CQ Contest...”

And that’s when the magic begins.

“Every contact is a story, every voice an invisible bridge. Amid the noise of the ether, the pulse of the world can still be heard.”



Photo by: Facebook CQWW

More Than a Contest: A Living Tradition

Participating in the CQWW is not just about accumulating contacts, multipliers, or points. It is about reliving a story that connects us with decades of amateur radio operators who, year after year, have upheld this global celebration of the spectrum.

Every time we press the PTT and give our call sign, we join that long chain of voices that, since the 1940s, has woven invisible friendships across the planet. Many of us remember our first CQWW with a smile.

The nervousness, the trembling hands while logging a contact, the thrill of hearing a DX station respond to our call. That moment when, with an improvised antenna and an old transceiver, we managed to cross the Atlantic or reach a country we had only known from maps. The contest has that power: to make the world feel smaller, closer, more human.



Photo by: g4bra.org

After the Noise, the Calm

A week has passed since this year's CQWW SSB ended. The bands have returned to their normal rhythm, the equipment rests, and the logs have been submitted.

But in the heart of every participant remains something more lasting than a score: the feeling of having been part of something immense, a living network that connects cultures, languages, and generations.

That dawn when propagation smiled upon us, that unexpected contact with a distant station, the thrill of hearing our own echo travel across the ionosphere... These are moments preserved in memory like sound postcards. Because radio, beyond its technique, is memory and emotion.

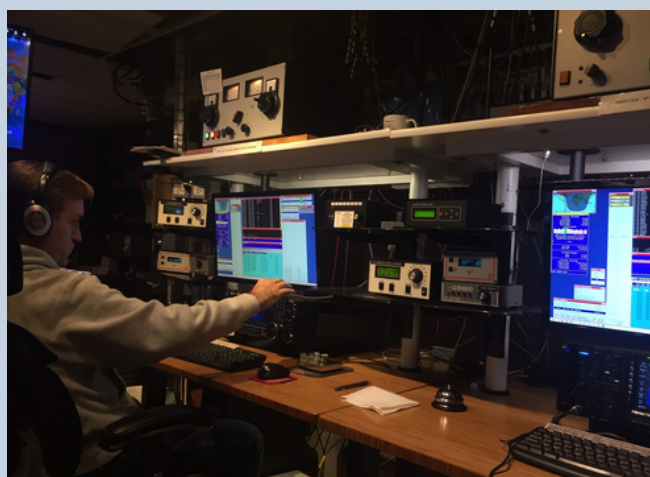


Foto de: www.w5wz.com

The Call That Continues

The CQWW reminds us why we love this hobby. It invites us to see our stations not just as equipment, but as open doors to the world. It inspires us to keep learning, to improve our antennas, to teach others, and above all, to keep the spark of the radio spirit alive.

At SWR, we celebrate everyone who, with patience, passion, and a touch of madness, participated in this edition. Those who transmitted from home or a remote island, those who woke up early, and those who stayed up until dawn listening to signals.

To all of them, thank you for keeping the spirit of the CQ World Wide alive. Because as long as there are voices calling "QRZ?" and someone answers on the other end, the world will continue turning a little closer... across the airwaves.

The CQWW SSB is much more than a contest: it is a rendezvous with history, a bridge between generations, and a celebration of human ingenuity. Every call, every contact, is a small victory over distance and silence.

When the bands fall silent and the last signal disappears from the spectrum, what remains are not just logs, but memories that resonate with the same strength as a 5/9 signal.

In an increasingly digital and fleeting world, amateur radio reminds us of something essential: there is still magic in listening, in waiting for propagation, and in sharing a simple greeting with someone who, though thousands of kilometers away, feels as if they are right on the other side of the headset.



Photo by: d4c.cc/cqww-ssb-2024

CQWW SSB Facts

- First contest held: 1948
- Average participation: Over 30,000 stations worldwide
- Possible contacts: Between 200 and 300 DXCC countries and entities
- Modes: SSB (last weekend of October) and CW (November)
- Current world record: Over 40 million points in the Multi-Multi category



Photo by: pj2t.org/ccq/cqww.

Here's a polished English translation of your closing lines, keeping the inspiring tone: The CQWW may end, yes... but the spirit of calling and listening, of connecting and learning, never fades.

Because as long as there is an antenna standing and a voice saying "CQ," amateur radio will continue to live in each of us.



Photo by: ae5x.blogspot.com



FROM THE WORKSHOP: HOW TO BUILD A 4:1 BALUN STEP BY STEP

By: Jose M. Candelaria NP4ET

Introduction

Every amateur radio operator who ventures beyond coaxial cable has heard of the balun — that small but essential component that balances the world between balanced and unbalanced lines.

The 4:1 balun is especially useful when we need to match an antenna with an impedance of around 200 Ω to our 50 Ω transmitter or coaxial line.

In this workshop, we'll show you how to build a 4:1 balun step by step, inspired by and supported with reliable technical sources. It's perfect for your center-fed half-wave dipole, OCFD, or loop antenna projects.

Photo by: palomar-engineers.com

Required Materials

Here's a suggested list of components — you can adjust it depending on availability or the power level you plan to handle:

💡 **Workshop Tip:** If you plan to operate at power levels above 400 W, consider using #31 ferrite cores and Teflon-coated wire to prevent overheating.

Component	Suggested specifications	Comments
Ferrite cores / toroids	2 × FT-240-31 (o FT-240-43)	Many use two separate toroids to improve isolation.
Conductor wire	Enameled copper wire suitable for the station's power level	Use an appropriate gauge to prevent losses or overheating.
Protective enclosure	Plastic or metal enclosure for mounting	Ensure it is properly sealed against moisture.
Connectors	Coaxial connector (e.g., N, SO-239, etc.) and antenna terminals	According to your antenna system
Sealing material / putty	RTV sealant or similar	To protect the interior against moisture
Mechanical components	Screws, nuts, insulators, brackets	To secure the cores, wires, and connectors

Theory in brief:

A 4:1 balun converts an impedance four times higher or lower, depending on the direction of energy flow. In our case:

200 Ω (balanced antenna) $\rightarrow$ 50 Ω (unbalanced coaxial line)

It works by combining two bifilar windings in series (balanced side) and parallel (coaxial side), achieving the transformation through magnetic coupling between the ferrite cores.

- Many build the balun using two separate cores, each with bifilar windings, to improve isolation between windings and allow higher current.



Prepare the cores

Use two FT-240-43 toroids. Clean their surfaces and mark the starting point of the winding on both. Place them together if you want higher inductance (optional).

Wind the bifilar wire

Cut about 60 cm of twin wire (two parallel conductors). Wind 12 turns evenly around the core. Make sure to maintain the same winding direction on both cores. Mark the ends to identify each pair.

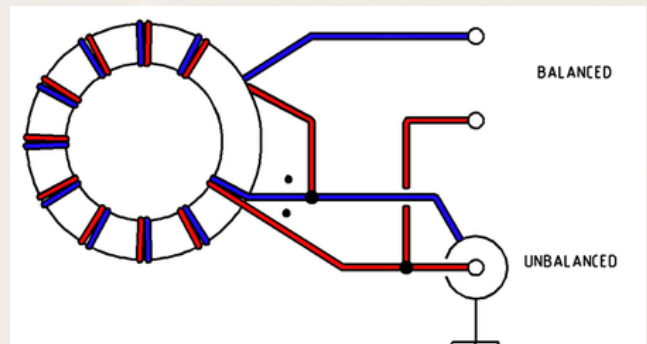
Tip: Keep the turns even and tight. Uneven spacing affects the symmetry of the magnetic field.

Electrical connections

- Connect the windings in series on the balanced side (antenna) and in parallel on the unbalanced side (coaxial).
- Check polarity: reversing one end will ruin the balance. Solder and insulate with heat-shrink tubing.

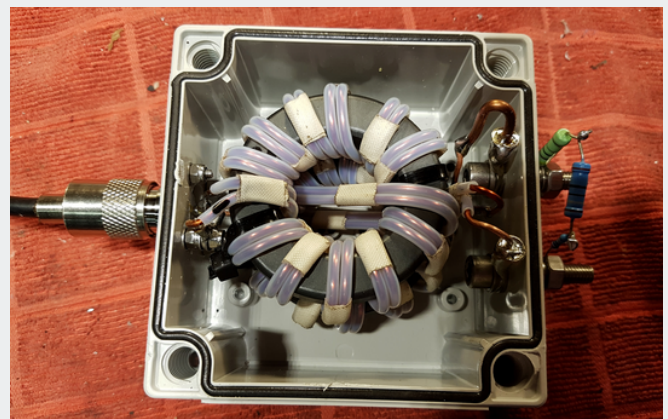
Final assembly

- Secure the cores inside the enclosure using cable ties or dielectric foam.
- Connect the terminals and the coaxial connector (SO-239 or N). Apply RTV sealant at the entry points and close the lid tightly.



Testing

- Connect the balun to an antenna analyzer or VNA.
- Verify that the impedance is close to 50 Ω on your operating bands. Check that the SWR is low and that there is no overheating during transmission.



Expected results

A good 4:1 balun provides:

- Losses below 0.5 dB in HF.
- Common-mode current isolation greater than 25 dB.
- SWR < 1.5:1 on most bands.

Conclusion

Building your own 4:1 balun is a rewarding experience that improves your antenna system and deepens your understanding of practical radio frequency. Additionally, every transmission will remind you that this performance was achieved by you, right from your own workshop. "Knowledge is not only transmitted through the air; it is also wound, soldered, and tested."

DXpeditions

Each DXpedition is an adventure that goes beyond radio. It is the exploration of remote places, the encounter with new cultures, and the connection with people around the world through invisible waves. Every contact is a memory, every signal a bridge that shortens distances and unites passions. In every DXpedition, we discover not only unknown territories but also the thrill of communication and the spirit of community that binds us as amateur radio operators.



01

The history of Madagascar is a fascinating blend of cultures and events. Populated around 2,500 years ago by Bantu Africans and Austronesians arriving by canoe, its inhabitants gave rise to the Malagasy people. Marco Polo mistakenly named it, and centuries later it became a refuge for pirates and the setting of the legendary Libertalia state. In the 18th century, adventurer Moritz von Benevsky attempted to colonize it for France, which finally conquered it in 1897. During World War II, the island was under the control of the Vichy regime and was part of the failed Nazi "Madagascar Plan" to deport European Jews. After the war, it returned to French colonial rule until gaining independence in 1960. Today, Madagascar amazes with its unique biodiversity, though it remains an expensive destination with limited infrastructure.

01.

5R8TT 5R8XX

Madagascar

The 5R8TT / 5R8XX team will be active from Madagascar, from October 29 to November 12, 2025.

Team: Members of the Italian DXpedition team – IK2RZP, I2PJA, IV3ZXQ, I2YSB, IK2CKR, IK2HKT, IIFQH, I1HJT.

Recent DX spots: 5R8TT





02

02.

5H3MB Tanzania

5H3MB – Maurizio Buffoli, IK2GZU, will be active again as 5H3MB from Tanzania starting October 16, 2025.

He will operate on 80–10 m bands, in CW, SSB, and digital modes.

Latest DX alerts for 5H3MB.

Tanzania has a history shaped by the blending of peoples and cultural exchange. Its earliest inhabitants were Bushmen and Hottentots, followed by Cushites and Bantu peoples, while Zanzibar became an Arab and Indian trading hub where the Swahili people emerged. After the passage of the Portuguese and Arabs, Germany established a protectorate in 1885, and later Britain took control after World War II. In 1961 Tanganyika and in 1963 Zanzibar achieved independence, uniting in 1964 as Tanzania. The country adopted a socialist system and later, in 1995, established democracy. Today, Tanzania is known for its rich biodiversity, national parks such as the Serengeti and Ngorongoro Crater, and its vibrant culture reflected in its cuisine and traditions.

03

Rodrigues Island, in the Indian Ocean, is a natural paradise with unique flora and fauna. It is home to 42 endemic tree species and the Rodrigues fruit bat, *Pteropus rodricensis*. Surrounded by distinctive coral reefs, it offers picturesque beaches, ideal for enjoying the sea, fishing, and diving.

03.

3B9KW 3B9/M0CFW

Rodrigues Island

Kazu, M0CFW, will be active as 3B9KW from Rodrigues Island, IOTA AF-017, during the CQ WW DX SSB Contest on October 25–26, 2025, and the CQ WW DX CW Contest on November 29–30, 2025.

He will operate in the single-operator category across all bands.

Recent DX announcements for 3B9KW.

Recent DX announcements for 3B9/M0CFW.

Outside the contests, he will be active as 3B9/M0CFW.





By: SVR Editorial Team

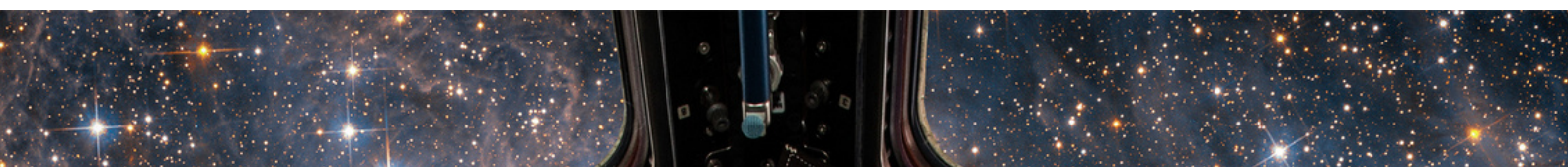
EARTH-BASED SUPPORT

NASA IS SEEKING AMATEUR RADIO OPERATORS TO TRACK ARTEMIS II

How amateur radio operators can participate, what equipment is needed, and why it is important for lunar exploration

NASA is inviting the community—including amateur radio operators—to volunteer as passive trackers for the Orion capsule during the Artemis II mission, the first crewed test flight around the Moon and back to Earth. This initiative is part of the Space Communications and Navigation (SCaN)

program and aims to explore and document tracking capabilities outside traditional government networks.



What exactly is NASA asking for?

The agency seeks participants capable of receiving the return signal in the S band (Orion uses S-band links) and recording the carrier for Doppler measurements while maintaining “carrier lock.” Volunteers will perform passive tracking: they must not transmit to Orion, only receive and document signals for later analysis by SCA_N. The call includes institutions, companies, universities, organizations, and individual amateur radio operators.

Why does NASA need this?

Although NASA uses its networks (Deep Space Network and Near Space Network) as primary support, it aims to evaluate commercial and community tracking capabilities to move toward more collaborative/commercial approaches for lunar and Mars mission support. Previous experience with Artemis I showed that external collaborators—including hams—could provide useful data, prompting a repeat invitation for Artemis II.

Recommended equipment

Based on publicly shared technical descriptions, useful capabilities include:

- S-band antenna (S-band dish or helical/patch antenna with adequate gain for 2.2–2.29 GHz).
- Sensitive S-band receiver capable of isolating the return link carrier; many participants use SDRs (software-defined radios) covering 2.2–2.29 GHz.
- Low-noise frontend and preamplifier (LNA) to improve the signal-to-noise ratio.
- Software for demodulation, Doppler analysis, and carrier monitoring/locking.

- Locking (tools & software) Use SDR tools plus scripts or specialized packages to maintain carrier lock.
- Record data with precise timestamps (UTC) and detailed logs for submission to NASA/SCA_N.

Practical steps for interested amateur radio operators

1. Check the official announcement: Review NASA SCA_N's opportunity announcement, which contains contact information and instructions for expressing interest.
2. Evaluate your equipment: If you have an S-band antenna and an SDR capable of receiving 2.2–2.29 GHz, document your setup (antenna, gain, LNA, receiver, software). If not, consider collaborating with universities, clubs, or stations with S-band antennas.
3. Conduct preliminary tests: Try receiving known satellites or S-band transmissions to validate your signal chain (antenna, LNA, software, time synchronization). These tests build confidence for achieving and maintaining carrier lock during Orion passes.
4. Document and submit results: Record audio/IQ files, logs with UTC, station location (coordinates), antenna data, and capture times. NASA will request these reports for analysis.

Previous experiences and expectations

During Artemis I (uncrewed mission), dozens of volunteers demonstrated that non-governmental equipment can receive useful signals and even measure Doppler shifts with modest setups. Feedback from hams who participated in 2022 shows that, even with relatively small antennas, valuable data can be obtained if the setup and software are properly tuned.

Benefits for the ham community

- Contribute to a historic mission: Participating in the first crewed flight of the Artemis program offers direct experience with modern lunar exploration.
- Technical learning: Hands-on practice with S-band reception, Doppler tracking, and signal processing in deep-space environments.
- Visibility and collaboration: Opportunities to coordinate with universities, companies, and agencies; ARRL and other groups are promoting participation.



Final recommendations and warnings

- Do not transmit to Orion: Participation is strictly passive. Unauthorized transmissions toward the spacecraft or mission networks could cause issues and are prohibited.
- Synchronize clocks and logs in UTC: This ensures the data is scientifically useful.
- Contact early: The public announcement includes deadlines for expressing interest; check the SCan website and NASA's official announcement. The note also provides contact information for Goddard's office for technical questions.



Closing

NASA's call for Artemis II volunteers is a unique opportunity for amateur radio operators to put their expertise to work on a historic lunar mission. With the right equipment, some practice, and careful documentation, hams can provide valuable measurements that help shape the future of commercial and community-based space tracking.



Conclusion

The collaboration between NASA and amateur radio operators demonstrates that space exploration is no longer exclusive to large agencies: today, from a personal workshop or station, any ham can contribute real data to a lunar mission. Artemis II will be not only a journey around the Moon but also a bridge between professional science and the amateur passion that has driven radio since its origins.

New SDR

THE NEW PARADIGM IN SDR

ANAN-G2 ULTRA

HF & 6M 100 W



By: SWR Editorial Team

ANAN-G2 Ultra HF & 6M 100 W – Technology That Revolutionizes!

The ANAN-G2 Ultra redefines the SDR experience with power and precision.

The ANAN-G2 Ultra is not just a transceiver: it is a standalone SDR station that redefines what we expect from modern amateur radio.

Photos by: apache-labs.com

In the ongoing evolution of software-defined radio (SDR), Apache Labs has taken a significant step forward with the launch of its next-generation model: the ANAN-G2 Ultra HF & 6M 100W Ultra High Performance SDR. With major improvements in processing, front panel, interface, features, and overall performance, this radio promises to redefine the operating experience for discerning amateur radio operators. In this article, we will provide a technical overview, highlight its strengths, advantages over previous generations, potential challenges, and suggest ideal use scenarios for this platform.

Apache Labs is already well-known for its ANAN line of SDR transceivers (such as the ANAN-7000, ANAN-8000, etc.). The leap to the G2 (second generation) represents a significant evolution, particularly because it incorporates functions that previously depended almost entirely on a connected PC. On its official page, Apache Labs describes this G2 Ultra version as the most advanced G2, with improvements in display, front-panel controls, and overall usability.

It is currently offered on a pre-order basis, meaning users place advance orders with an estimated lead time of about two weeks at certain stages. This suggests that, at the time of writing, mass distribution or full availability may still be in progress.

Highlighted features of the ANAN-G2 Ultra

Here are the key aspects of the transceiver, with some technical explanations:

Architecture and processing

- The G2 Ultra integrates a large FPGA with 930 GMAC/s processing capability, along with an onboard 4-core SoC (Quad Core). This allows it to handle complex real-time algorithms such as PureSignal, diversity reception, and advanced noise mitigation (NR2).
- Compared to previous models like the ANAN-7000 or 8000, the leap in processing capacity is significant (for example, the ANAN-7000/8000 peaked at ~240 GMAC/s).
- This provides room for advanced future features, such as high-performance remote operation, without relying heavily on the connected PC hardware.



Autonomous operation and compatibility

- One of the major advantages of the G2 Ultra is its ability to operate in stand-alone mode, without the need for constant connection to a computer.
- At the same time, it remains fully compatible with Thetis software for users who prefer operating from a PC or laptop.
- Regarding remote operation, the hardware is designed to support future remote functionalities, although some features may depend on subsequent firmware/software developments.

Front panel, display, and controls

The Ultra model features an 8-inch higher-resolution display, improving visibility of the graphical user interface (GUI).

- The front panel has been redesigned with more physical controls (buttons, knobs, LED indicators) to offer more direct operation without relying solely on a PC.
- The front chassis is CNC-machined aluminum, enhancing shielding and isolation.
- These controls are expected to integrate more deeply with Thetis, even while running on a PC or laptop.



Frequency range, receive and transmit performance

- The receiver covers 9 kHz to 60 MHz, including the full HF spectrum and the 6-meter band (50 MHz).
- It uses a Direct Sampling DDC/DUC architecture.
- It delivers 100 W PEP in modes such as SSB, CW, FM, and digital; in AM it operates from 1 to 30 W (up to 100 W in CW).
- The design emphasizes high linearity: for example, typical IMD3 around -68 dB relative to PEP on 20 m.
- Typical harmonics are better than -43 dBc on HF and -60 dBc on 6M.
- Carrier and opposite sideband suppression exceed -80 dBc.
- The receive block includes two synchronous 16-bit ADCs, each with independent filter banks.
- Reciprocal Mixing Dynamic Range (RMDR) is specified at 116 dB with a 2 kHz offset.
- Image rejection reaches 90 dB.

Inputs/outputs and connectivity

Multiple connections: BNC ports (antenna, bypass, loop, RX2), audio inputs/outputs, microphone with preamplifier (balanced XLR inputs), dual 4K HDMI outputs for external displays,

ethernet port, USB ports, 10 MHz reference input, PTT, and others.

- Dimensions: Approximately 314 mm (W) $\times$ 138 mm (H) $\times$ 368 mm (D) (excluding protrusions).
- Estimated weight: 7.5 kg.
- Power requirements: 13.8 V DC @ 25 A (transmit) / ~ 2.5 A (receive).

Conclusion

The ANAN-G2 Ultra HF & 6M 100W represents an ambitious effort by Apache Labs to bring high-performance SDR to a new generation. With clear improvements in processing, design, usability, and growth potential, it has the capability to become a benchmark for advanced stations. Its success will depend not only on its hardware but also on the evolution of firmware, software support, and the user ecosystem that adopts it.

For SWR magazine, this equipment stands out as one of the most exciting recent releases in the high-end SDR segment.



Signals in Silence

Sitting in the stillness of the landscape, the radio reminds us that every signal is an invisible bridge connecting people and places, no matter the distance.

By: SWR Editorial Team

THE LOST ART OF CW

THE BEAUTY OF TELEGRAPHY IN MODERN TIMES

A Journey to the Heart of Amateur Radio

In an era dominated by instant and digital communication, few transmission modes preserve the elegance and essence of radio like CW (Continuous Wave), popularly known as telegraphy or Morse code. Although its use has declined, its legacy endures within the amateur radio community, which keeps alive this tradition that connects generations and cultures through simple dots and dashes.



Photo by: hamradioqrp

The First Echoes of CW

Morse code was developed in the 1830s by Samuel Morse and Alfred Vail. Its purpose was to provide an efficient means of transmitting messages through telegraph lines. Each letter of the alphabet and each number is represented by a sequence of dots (·) and dashes (–), allowing for clear and precise transmission of information.

The Transition to Radiotelegraphy

The evolution of Morse code made its adaptation to radio waves possible, giving birth to radiotelegraphy. This advancement revolutionized communications, especially in the maritime world, where it was used to transmit messages between ships and coastal stations. The ability to send messages without the need for wires opened new possibilities for long-distance communication.

The Revival of CW in Amateur Radio

Despite the emergence of more modern technologies, CW remains a valued mode among amateur radio operators. Its efficiency under challenging propagation conditions and its low bandwidth make it ideal for long-distance communications. Additionally, operating in CW requires skills and expertise that many find both rewarding and challenging.

Benefits of CW in Amateur Radio

- Efficiency in adverse conditions: CW can be received even with weak signals, allowing communication in situations where other modes fail.
- Low bandwidth: It requires less space on the frequency spectrum, enabling more simultaneous communications.
- Skill development: Improving in CW involves practicing and refining listening and sending skills, which can be highly satisfying.



The Magic of CW Today

In a world saturated with digital communications, CW offers a unique and personal connection. Each signal sent and received is the result of the operator's dedication and effort, creating an authentic and rewarding experience. Moreover, CW remains an invaluable tool in emergency situations, where its efficiency and range can make a critical difference.



Conclusion

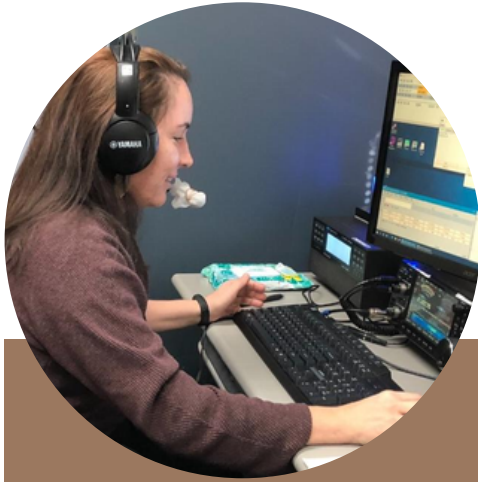
Although considered by some as an obsolete technique, Morse code remains an integral part of amateur radio. Its simplicity, efficiency, and the skill required to master it give it a unique beauty that continues to be appreciated by generations of radio enthusiasts. In a digitalized world, CW offers a tangible connection to the roots of wireless communication, reminding us of the elegance of past forms of communication.

And now, for something completely different...

Radio Frequency and Telemetry in Insect Tracking

Advances and Perspectives

By: Erika Isabel Natarajan VA7ISI/HJ1ISI



Erika Isabel Natarajan

VA7ISI/HJ1ISI is a Canadian-Colombian biologist with a deep passion for insects and biodiversity. She has worked in the field of entomology and enjoys sharing her knowledge of nature through both research and community projects. Erika is also an active amateur radio operator in Canada and Colombia, finding connection and collaboration through the radio waves. Her work bridges cultures, countries, and disciplines, always guided by her love for science and the natural world. She is fascinated by the tiny creatures we call insects, whose delicate lives hold immense significance.

Radio Telemetry

Radio telemetry is the remote transmission of information using electromagnetic waves—typically radio waves—from a transmitter attached to an animal to a receiver operated by a researcher. Applied to wildlife, this technique—also known as radio tracking or radio tagging—has profoundly transformed ecological research, enabling scientists to answer questions about movement, habitat use, behavior, survival, and dispersal that would be impossible to address through direct observation alone.

Wildlife radio telemetry is, in some ways, analogous to the well-known amateur radio practice of “fox hunting”: in both cases, directional receivers, such as Yagi antennas, are used to locate the source of a signal within the VHF spectrum. However, tracking animals in the wild presents additional challenges. Unlike a hidden, stationary transmitter, a living creature equipped with a radio transmitter can move quickly, hide within vegetation, or alter its behavior depending on weather conditions and resource availability.

Therefore, beyond skill in radio-tracking techniques, successful monitoring requires detailed biological knowledge of the species’ ecology, activity schedules, flight patterns, and occupied microhabitats. This combination makes wildlife telemetry a truly interdisciplinary field, where expertise in radio and biology complement each other to achieve reliable results.

Three main types of telemetry are recognized:

- **Terrestrial telemetry:** Uses portable receivers operating in the Very High Frequency (VHF, 150–151 MHz) band with directional antennas such as Yagi antennas.
- **Satellite telemetry (PTT):** Employs Ultra High Frequency (UHF) signals to transmit data to geostationary satellites, enabling large-scale tracking.
- **GPS telemetry:** Transmitters calculate the animal’s position via satellite triangulation, storing data internally or transmitting it in real time to a modem.

Today, radio telemetry has become a fundamental tool in conservation biology and ecology. Its use is widespread among birds, mammals, and reptiles, providing crucial information on activity areas, dispersal, and behavior. In wildlife studies, the methods used to attach transmitters are a critical aspect, as they determine not only the quality of the data obtained but also the animal's welfare. In research design, both the mounting method and the technical characteristics of transmitters and receiver antennas are decisive factors for telemetry success.



Attachment methods must be adapted to the species' morphology, weight, and behavior. Medium and large mammals typically carry collars, while birds use harnesses designed not to interfere with flight. Insects and small vertebrates generally require non-toxic adhesives to attach transmitters to the exoskeleton or feathers, although the duration is usually limited. In species that tolerate more handling, subcutaneous implants can be used; however, these require specialized training and carry risks related to stress and survival.

Transmitters consist of a quartz crystal calibrated to emit at a specific frequency (commonly between 150–151 MHz in Europe and North America), a power source—usually lithium or silver batteries—a mounting system, and a transmitting antenna. Some transmitters also incorporate sensors to record physiological variables (temperature, heart rate, activity) or behavioral parameters (movement, inactivity, mortality).



The design of the transmitting antenna is also critical. Transmitters typically include whip antennas made of stainless steel wire, which provide versatility and efficient signal propagation. Another option is loop antennas, constructed from copper plates shaped as collars, where the antenna is integrated into the mounting system itself. The antenna's length and thickness are directly related to the transmission frequency and must not be altered, as cutting or bending it would severely compromise signal strength, making the animal difficult to locate. For this reason, manufacturers often reinforce this connection with protective materials.

The receiver subsystem is composed of receiving antennas

and a radio unit that amplifies and converts the signal into audible or digital information. Omnidirectional antennas, such as dipoles, allow detection of the transmitter's presence over a general area but do not provide directional information. In contrast, directional antennas, such as Yagi antennas, are the most commonly used in wildlife telemetry for frequencies above 140 MHz. These can be portable (2–3 elements) or fixed (up to 12 elements) and are valued for their high gain, which allows precise determination of the signal's direction.

Other variants include circular or paddle antennas, useful at lower frequencies (<100 MHz) and often applied in aquatic wildlife studies, as well as Adcock H antennas, which have directional limitations but are practical for contexts such as tracking fish in rivers.

Finally, receivers—both analog and digital—amplify the signal and make it usable. Analog models, although older, remain in use due to their proven durability under extreme conditions, while digital receivers offer greater versatility and the ability to handle multiple frequencies simultaneously.

Overall, the correct choice of attachment method, transmitter, antenna, and receiver not only ensures the collection of reliable data but also minimizes disruption to the behavior and survival of the tracked animal. These techniques have proven effective in...

mammals, birds, fish, and reptiles—groups with relatively stable morphology throughout their life cycle.

In telemetry, the main technical limitation is the weight of the transmitter, which should not exceed 5–10% of the animal's body mass to avoid impairing locomotion. When additional sensors are included to record physiological variables—such as body temperature, heart rate, or activity—the size and weight of the transmitter increase, reducing battery life and accentuating operational limitations.

Although telemetry is well-established in vertebrates, its application to small animals—particularly insects—remains a significant challenge. Their biology and life cycle include highly differentiated stages (egg, larva or nymph, pupa, and adult), during which morphology, physiology, and behavior change drastically. Unlike vertebrates, which maintain stable body structures, insects undergo successive molts of the exoskeleton and, in many cases, complete or incomplete metamorphosis. These transformations complicate the use of tracking devices and have limited telemetry studies mainly to large, strong-flying adults, the only ones capable of carrying transmitters without severely compromising performance. In 2021, Walter and colleagues proposed an alternative real-time tracking system based on short-wave

infrared (SWIR) radiation, using ultralight photoluminescent tags and rapid motion detection with minimal environmental interference. To test it, they developed the SWIRD (Short Wave Infrared Detection System), which consists of a detector sensitive to 1400 nm radiation and photoluminescent (PL) tags made of passivated lead sulfide quantum dots, weighing ~12.5 mg with a diameter of 5 mm. These tags required no antenna or battery, drastically reducing the impact on flight. Field trials were conducted in a natural flight enclosure with bumblebees (*Bombus* spp.) and hummingbird hawk-moths (*Macroglossum stellatarum*). The system recorded positions at 102 Hz with a latency of less than 10 ms.

The results demonstrated real-time tracking of individual flights with sufficient precision to capture rapid maneuvers and complex trajectories. The tagged bumblebees exhibited normal foraging behavior and were tracked over consecutive flights without the need to remove the tags. In the hawk-moths, flight sequences of several minutes were recorded with a temporal resolution 300 times higher than that of traditional harmonic radars.

Wacker (2024) hypothesized that VHF transmitters could be effectively applied to large carpenter bees (*Xylocopa valga* and *X. violacea*), using automated receiving systems to provide greater efficiency and data volume than manual tracking. In Austria's Neusiedler See–

Seewinkel National Park, fifteen carpenter bees were captured, selecting the largest individuals to maintain a transmitter-to-body-mass ratio below 40%. Active VHF transmitters weighing 180 mg ($24.5 \pm 5.6\%$ of body mass) were placed on the thorax. Tracking combined manual Yagi antennas with ten fixed receiver stations distributed over 8 km². The data were processed using Azimuthal Telemetry (ATM) and continuous-time movement models (ctmm).



Twelve of the fifteen bees successfully flew with the transmitters; three *X. violacea* individuals were unable to take off due to the load. Tracking duration ranged from 45 minutes to 47 hours (mean 5.9 hours). Manual tracking produced approximately 20 high-precision locations per bee, though with limited spatial coverage. The automated stations generated up to 1,561 records per individual, albeit with greater spatial uncertainty due to station density and electromagnetic interference. Activity ranges varied between 0.02 and 19.1 km² (mean 4.61 ± 7.94 km²),

being larger in *X. valga* and much smaller in *X. violacea*, likely limited by transmitter weight. Recovery of the devices was challenging, with frequent losses due to detachment or distorted signals.

Limitations included temporary signal loss when vegetation blocked the tags, signal occlusion due to rotation, and the detector's restricted field of view, which required continuous tracking. Despite these challenges, the study highlighted a technological innovation: replacing heavy antennas and transmitters with ultralight optical tags and real-time SWIR detection. Although experimental, the results show potential to overcome previous limitations and move toward more precise and less invasive tracking of small flying insects in natural conditions.

Beyond VHF or radar telemetry, complementary "tagless" approaches are emerging, in which movement is recorded via video rather than transmitters. This belongs to the field of Movement Ecology, raising the possibility of tracking flying insects with UAVs (drones) equipped with aerial cameras.

Image-based tracking has proven effective for reconstructing 2D and 3D trajectories at sampling frequencies above 1 Hz in laboratories, semi-natural insectaries, and natural environments.

Using drones as telemetry receivers for insects offers an innovative solution to overcome the range and line-of-sight limitations of ground-based tracking.

Conventional VHF telemetry relies on portable antennas or fixed stations with limited range (~150–500 m) and high dependency on terrain and obstacles (Kenward, 2001). In contrast, UAVs equipped with VHF receivers elevate the antenna and improve line of sight, increasing coverage and detection probability. Field validations show clear improvements over manual tracking, for example, by triangulating RSSI signals from drones.

RSSI (Received Signal Strength Indicator) measures the strength of a radiofrequency signal received by a receiver. In telemetry, RSSI serves as an indirect estimate of the distance between the animal's transmitter and the receiver (antenna or drone). Practically, stronger signals (high RSSI) indicate proximity, while weaker signals (low RSSI) suggest distance or obstacles affecting signal propagation.

Traditionally, RSSI is measured manually by rotating directional antennas such as Yagi antennas to triangulate the signal's origin. With drones, this technique has been modernized: UAVs record variations in signal strength as they move, allowing real-time triangulation of position with greater speed and coverage.

While ground-based telemetry produces scattered location points, UAVs can quickly cover large areas, follow dynamic trajectories, and adapt to species that are difficult to reach in open habitats. Commercial off-the-shelf platforms are now available, compatible with standard VHF tags and consumer drones, and have already been applied to various taxa, including insects (Wildlife Drones, 2023).

New insect-tracking technologies—such as miniaturized VHF transmitters, ultralight photoluminescent tags (SWIR), harmonic radars, and drones equipped with receivers or cameras—are transforming telemetry by overcoming the limitations imposed by insects' small size and mobility. These innovations enable real-time, high-resolution data collection with minimal impact on the organisms, which is key to advancing understanding of their biology, ecology, and behavior, while also providing valuable tools for biodiversity management and the control of agricultural and public health pests.

~ Erika VA7ISI/HJ1ISI

Erika was featured in The Communicator (March 2023): <https://archive.org/details/sarc-communicator-2023-03/page/106/mode/2up>

How to Attach a Transmitter to a Bee:

TRIVIA DX

GUESS THE SIGNAL!

Instructions for the Reader:

Test your radio skills—both your ear and your eye! In this section, you'll find several signals. Each signal comes with a QR code.

1. Scan the QR code with your phone.
2. Listen to the signal.
3. Answer: What type of signal is it?
 - Possible options: CW, SSB, FM, AM, FT8, RTTY, etc.
4. At the end of the section, you'll find the correct answers.

Signal # 1



Signal # 2



Signal # 3



Signal # 4



Signal # 5



Signal # 6



1. FT8
2. PSK31
3. SSTV
4. CW
5. RTTY
6. Field Hell

By: SWR Editorial Team

All images are AI-generated.

THE ERA OF SMART RADIOS

WHEN ARTIFICIAL INTELLIGENCE JOINS HF COMMUNICATIONS

Let's imagine what that could mean.

Let's think of a transceiver that not only receives signals in CW, PSK, FT8, or Hellschreiber, but actually understands them. A radio that doesn't just decode Morse code, but recognizes your rhythm, your "fist", and adjusts its decoding for greater accuracy. One that could even automatically transmit in your own CW style, or revive forgotten modes like Feld Hell or Olivia, bringing digital history back to life.

Current SDR platforms are already incredibly powerful, and their prices have dropped to the point of being accessible to most radio amateurs. The processing power that once filled an entire desk now fits in the palm of your hand. With integrated AI, that same SDR could analyze band conditions, predict the Maximum Usable Frequency (MUF), and recommend the best band and mode for your communication, without needing to check a propagation website or open an app.

Imagine tuning into a noisy 20-meter band. The AI watches silently, learning the patterns of fading, interference, and modulation. It automatically adjusts the bandwidth, fine-tunes digital filters, and removes unwanted signals, all in real time, perfectly tailored to your current QSO. The operator would only need to focus on communicating, not on the controls.



BUT THE DREAM DOESN'T END THERE.

Imagine holding a QSO in your native language, while your colleague on the other side of the world hears your voice translated in real time into theirs, whether Spanish, Japanese, or Finnish. Text-based digital modes could do the same, removing language barriers and making HF a truly universal medium.

Or imagine a transceiver that “knows” your license privileges, automatically limiting your transmission range to authorized frequencies, or even suggesting available sections of the spectrum where you can operate legally.

None of this is impossible. In fact, most of these technologies already exist in other industries. Voice recognition, translation, signal processing, and predictive analysis are common features in smartphones and voice assistants. It's just a matter of adapting and integrating them into our world of RF, filters, and antennas.



The potential is enormous—not just for convenience, but for rekindling the magic that first drew us to amateur radio. This integration could attract a new generation raised on smart technology, while offering experienced operators a whole new level of performance and exploration.

The challenge now lies in the hands of the R&D teams and visionary marketers of the major radio manufacturers. Will it be Yaesu, Icom, Kenwood, FlexRadio, or perhaps an innovative newcomer, who takes the first step?

Because the truth is, the moment isn't tomorrow. The moment is now.

THE FUTURE HAS ITS OWN VOICE

“Smart radios” have the potential to profoundly transform the operator's experience. They could anticipate propagation conditions, adjust their parameters in real time, learn from our preferences, and even translate our words into other languages without losing tone or intent. But beyond these functions, what this revolution truly promises is to restore amateur radio's original mystique: the thrill of exploring the unknown—this time, not in physical space, but in the digital and cognitive universe that connects humans with machines.

The challenge is no longer purely technological, but philosophical: will amateur radio remain an art when an AI can select the best filter, the best band, or the best antenna for us? Perhaps the answer lies in remembering that, in the end, radio isn't just about frequencies—it's about people. About conversations, discoveries, and that spark that drives us to call “CQ” and wait, with hope, for a voice on the other side of the world.

The future of radio has its own voice, and it's ready to be heard.

The Nostalgia Nook

The Kenwood TS-520: When Radios Had Soul

Some radios don't just transmit signals—they transmit memories. Among the most cherished in amateur radio history, the Kenwood TS-520 holds a special, almost sacred place. It wasn't the most expensive, nor the most complex, yet it achieved what few radios have: becoming the beating heart of thousands of stations around the world.

Introduced in the 1970s, the TS-520 represented the transition between two eras: the tube era and the transistor era. With its hybrid design—tubes in the final stage and transistors throughout the rest of the circuitry, it delivered the warm, lively sound that enthusiasts still strive to recreate today. Those who operated it remember the gentle click of the relay engaging in transmit, the amber glow of its filaments, and that unmistakable scent of live electronics that filled the radio room. The TS-520 was a faithful companion. It endured hours of conversation, entire nights hunting signals on 40 meters, and sunrises accompanied by the gentle hum of its fan. Its panel, filled with silver knobs and precise needles, invited touch, patience, and the art of tuning by hand, with ear and with soul. In an era without screens or digital menus, every contact was a personal conquest, every QSO a story etched more in the heart than in the logbook.

Many still keep their 520 tucked away in a corner of the shack, perhaps covered with a cloth or resting on a shelf. And sometimes, on quiet nights, they power it on again—not out of necessity, but out of affection. Because turning its dial, hearing the ether's static come alive, feels like reconnecting with an old friend.

In an age dominated by SDRs and touchscreens, the Kenwood TS-520 reminds us of something essential: radio is not only heard with the ears, but also with the soul.



By: SWR Editorial Team

The Nostalgia Nook

Using Propagation Tools to Maximize Your Contest Score

Potho by: DX World

VOACAP

RADIO WAVES UNITE US

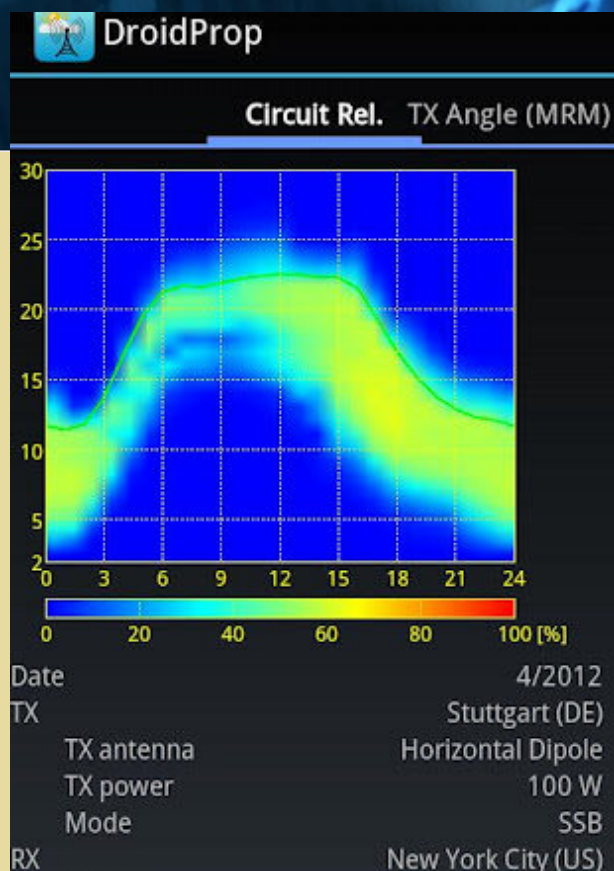


Image by: CQdx.ru

By: Abimael Padró, KP4RY

Photo by: www.dxworld.com

Propagation Is No Longer a Mystery

When I first started in contests, I quickly realized that success doesn't depend solely on your station or experience: propagation can be your greatest ally or your worst enemy. Today, thanks to technology, we can anticipate band behavior, analyze openings in each region, and plan our operation with precision.

Modern tools allow us to make strategic decisions in real time, which is vital for boosting our score—even if we have a modest station.

VOACAP: Interactive Maps for Smarter Decisions

VOACAP provides propagation maps where you can select distance and geographic azimuth. This allows us to decide whether it's better to use the short or long path to the station we want to contact. With these maps, we can predict when a band will be most open to a specific destination and maximize our contacts.

KP4RY Tip: Before the contest, study your most frequent paths using VOACAP—you'll see how even tough contacts become possible.



Space Weather Prediction Center: Science at the Service of DX

With data from GOES X-Ray Flux and the K-index every three hours, we can anticipate changes in the ionosphere. This tells us which bands will be open, when, and toward which regions of the world, helping us avoid wasted time and focus our efforts on what really works.

KP4RY Tip: Monitor the K-index during the contest, small fluctuations can open up unexpected opportunities.

FT8 and HAMClock: Real-Time Information

Today, tools like FT8 show in real time where our signal has been heard, allowing us to adjust power, band, or strategy.

Meanwhile, HAMClock, even installed on a Raspberry Pi during a contest, offers:

- Calculation of the Maximum Usable Frequency (MUF)
- Reporting of your grid square
- Identification of the most productive band at any given moment

This helps us decide which antenna to use and when, optimizing our time and boosting efficiency.

Learning by Doing: The Value of These Tools

Integrating these tools doesn't just increase your score—it teaches you to read propagation, anticipate openings, and plan your operation. Every map, every index, every FT8 report becomes a practical lesson that strengthens our skills as operators. Even with a modest station, we can compete efficiently and learn to make strategic decisions based on real data, rather than assumptions.

Conclusion: Propagation as an Ally

If you want to take your contest participation to the next level, these tools will become your best ally. Propagation stops being a mystery and becomes a strategic advantage. With planning and the right information, any operator can shine and make their mark in the world of DX.

Remember: it's not just about calling CQ—it's about operating smartly and reading the bands like a true strategist.



CONTACT

In the silence of the cosmos, an antenna waits.
The air vibrates, the noise of the universe whispers... and among the
waves, a wordless question rises:
Is anyone there?

So too is amateur radio:
a form of faith not spoken with lips,
but with dials and frequencies,
with the hope of finding a voice amid the infinite noise.

Ellie Arroway, in Contact, listened to the stars;
we, as radio amateurs, listen to the world.

She sought a signal to confirm we are not alone;
we seek a voice to remind us that connection is still possible.
Every CQ sent into the air is like a bottle cast into the cosmic ocean,
every reply, a small miracle,
a spark that unites two souls separated by thousands of kilometers... or
light-years.

Deep down, we all share the same quest:
to decipher the invisible language of the universe,
and in its echo, to recognize our humanity.

Because, as in Contact,
we do not listen merely to find others...
we listen to find ourselves.



LOS MOLINOS RADIO CLUB OF VILLA ALEMANA

HAS FORGED A PIONEERING EDUCATIONAL ALLIANCE WITH LICEO BICENTENARIO MARY GRAHAM.



The Los Molinos Radio Club of Villa Alemana, CE2CQ, as part of its mission to promote amateur radio and extend its reach into the community, has forged a pioneering educational alliance with Liceo Bicentenario Mary Graham, an institution that is part of the national network of Bicentennial High Schools, recognized for delivering high-quality education. This initiative aims to bring the world of amateur radio closer to the new generations.

Specifically, this collaboration will allow students to thoroughly explore the world of amateur radio, learn about the principles of communication, and develop technical and especially linguistic—skills. The latter will be achieved through

direct communication with amateur radio operators from different countries.



To formalize this alliance, several coordination meetings have been held with the goal of providing students with hands-on learning of radio communication equipment, practicing intercultural skills through global communication, and promoting cultural exchange. The latter will be achieved through direct interaction with amateur radio

operators from different countries.

On this occasion, the members of the Los Molinos Radio Club of Villa Alemana participated: its president, Lorenzo Passalacqua (CA2PJP), Mauricio Jorquera (CA2BPG), Adrián Marchant (CA2MHC), and Mauricio Rosales (CE2SQT/W9), who was visiting Chile. Representing Liceo Bicentenario, the teaching team attended, coordinated by Professor Luis Reyes Ruz, in charge of school life, along with the English, Arts, Technology, and other subject teachers.



Information and images provided by: Los Molinos Radio Club of Villa Alemana

By: Israel Cabrera (KP4AX)

Inspiration
Made into
an Antenna

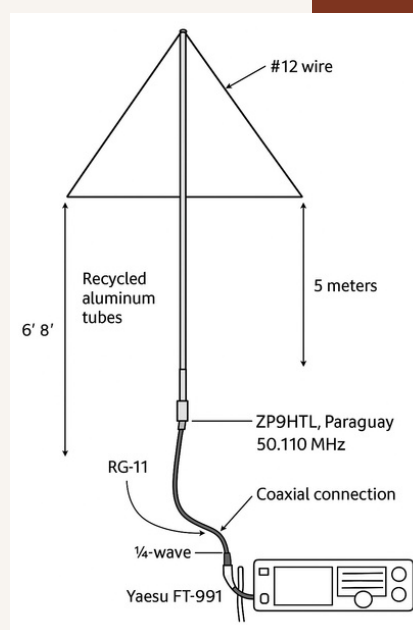
6 Meter Homebrew Delta Loop



In the exciting world of amateur radio, creativity and ingenuity are often the operator's most valuable tools. Achieving remarkable results doesn't always require a large budget or brand-new materials. This is the case with my latest project: a 6-meter Delta Loop antenna, built entirely from recycled materials, which, despite its simplicity, has demonstrated exceptional performance.

Inspiration and Concept

The idea came from noticing some old aluminum tubes that were part of an old set of brooms. They were lightweight, durable, and made of a material perfect for an antenna. Instead of discarding them, I decided to give them a new life. This is how the homebrew 50 MHz Delta Loop was born—designed to make the most of available resources and to show that, with ingenuity, any amateur radio operator can build an efficient antenna.



Materials Used

For the main structure, I used recycled aluminum tubes, each 6 feet 8 inches long, forming the two sides of the delta. The top element was made from #12 gauge wire, also recycled, originally sourced from old toroids or coils. This wire not only offered good conductivity but also the flexibility needed to maintain the triangular shape of the antenna.

The feed system was designed using RG-11 coaxial cable, cut to a quarter wavelength and calculated according to its velocity factor. This section acts as a matching line before connecting to the main RG-8 coax, which feeds the transmitter. With this configuration, I achieved a 1.1:1 SWR across the entire 6-meter band, demonstrating excellent coupling efficiency.

Assembly and Initial Testing

The antenna was installed at a height of 5 meters, using a simple mast and some support pieces that were also repurposed. The most exciting moment came during the initial tests: on the frequency 50.110 MHz, I managed to make contact with ZP9HTL, Ríos Maciel from Paraguay, who reported a 5-9 signal. My setup: a Yaesu FT-991, operating at moderate power.

That first contact confirmed that the effort had been worthwhile. From there, I continued making more DX contacts, surprising many colleagues who didn't believe that such a simple antenna, built with recycled materials, could perform so well.



Final Thoughts

Beyond the technical results, this project represents something deeper: the essence of amateur radio—building, experimenting, learning, and sharing. My Delta Loop not only allowed me to communicate with stations thousands of kilometers away, but also inspired fellow operators to see the materials around them in a new light.

Sometimes, the best antenna isn't the most expensive or complex, but the one born from the operator's passion and ingenuity. In my case, a few old tubes and some wire became a powerful tool for connecting with the world.

(Photos and diagrams accompany this article, showing the installed antenna and the materials used.)



**From the summit, every signal is a bridge
connecting the world.**



When Power Becomes a Problem

BY: JUAN MONTIJO WP4OV

A Good Signal Is Every Ham's Goal

But when your neighbors start knocking on your door, not to congratulate you on your signal reports, but to complain that their TVs, Wi-Fi, or speakers are producing noise, it's time to take a closer look at your station.

A friend shared the story of an experienced operator who had proudly installed a powerful double Delta Loop antenna for HF. This large setup, known for its gain and quiet reception, quickly proved effective on the bands. His signal reports were excellent... but so were the neighbors' complaints. Radios, phones, baby monitors, and even a smart refrigerator began experiencing interference. The operator was baffled. After all, he was operating within legal power limits and had mounted the antenna at a good height. So why was there so much RFI?

Three Common Culprits of RFI

In this case, there were three main causes, each offering valuable lessons for any amateur operator:

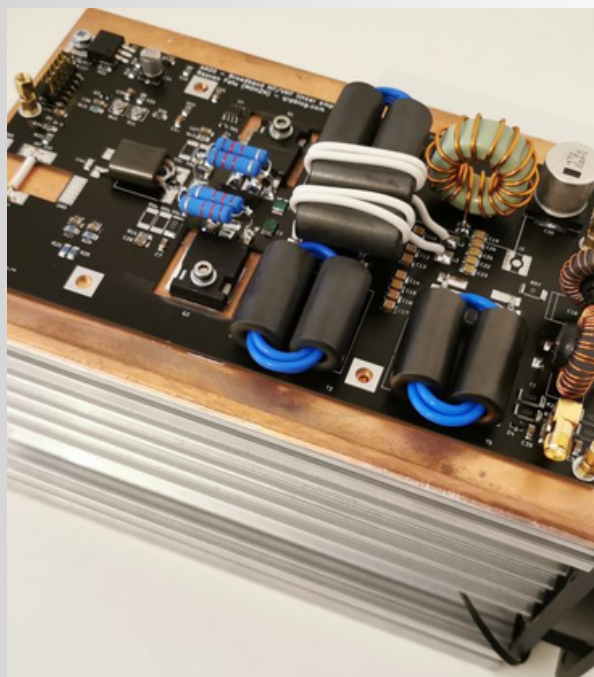
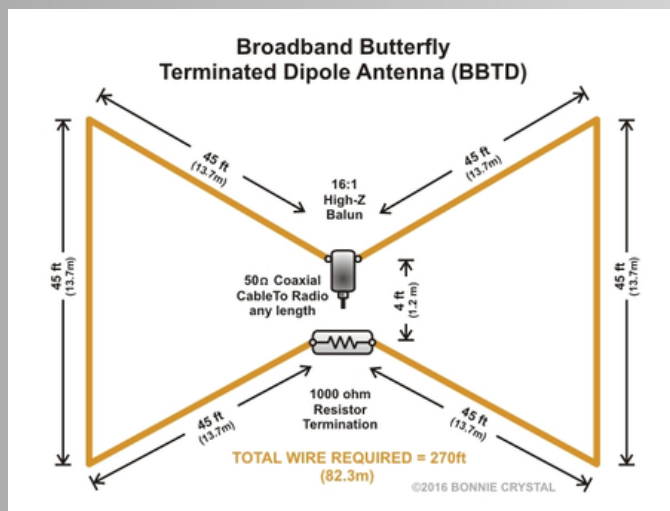


Photo by:qrpblog

1. Homebuilt LDMOS Amplifier Without Low-Pass Filters (LPF)

Although powerful and efficient, modern LDMOS amplifiers require proper filtering to suppress harmonics. The operator had built his own amplifier but had not included low-pass filters at the output. As a result, harmonic energy, especially in the higher HF bands, was leaking into his neighbors' electronic devices.

2. Operating Outside the Antenna's Design Frequency

The double Delta Loop antenna was built to resonate near the 20-meter band, but the operator used it on several bands without a tuner or matching system. When an antenna is operated outside its design frequency, it becomes inefficient and can radiate RF from unintended parts of the system.

RFI

3. Lack of a Proper RF Choke

Perhaps the biggest oversight was not using a properly designed RF choke at the feed point. Without it, common-mode current flows along the coax braid and radiates from the cable or household wiring, acting as an unintended antenna and causing interference in unexpected places.

How the Problem Was Solved

To his credit, the operator took the complaints seriously and implemented several important changes:

- Added a Proper RF Choke: Using type 31 ferrite cores and turns of coax, he installed chokes at the feed point and at the station input.
- Built and Installed LPF Filters: He later integrated low-pass filters between the amplifier output and the antenna coax, significantly reducing harmonics.
- Limited Out-of-Band Operation: He stayed within the antenna's resonant band, using a tuner only when absolutely necessary, and avoided transmitting with high SWR.
- Improved Station Grounding: A solid ground connection and bonding between equipment helped control unwanted RF paths.
- Talked with Neighbors: Rather than ignoring the complaints, he spoke with them, added ferrites where needed, and explained the situation.

Lessons for All Amateur Radio Operators

Even a well-built station can cause problems if important details are overlooked. Having a strong signal is good, but having a clean signal is essential.

Always:

- Use low-pass filters with homebuilt amplifiers.
- Operate your antennas within their design frequency range.
- Use proper RF chokes at the feed point.
- Pay attention to RFI signals and don't ignore complaints, even if they come from a neighbor rather than another ham.

After making these adjustments, the operator's signal remained strong, but the complaints disappeared. It was a valuable lesson on the difference between power and control.

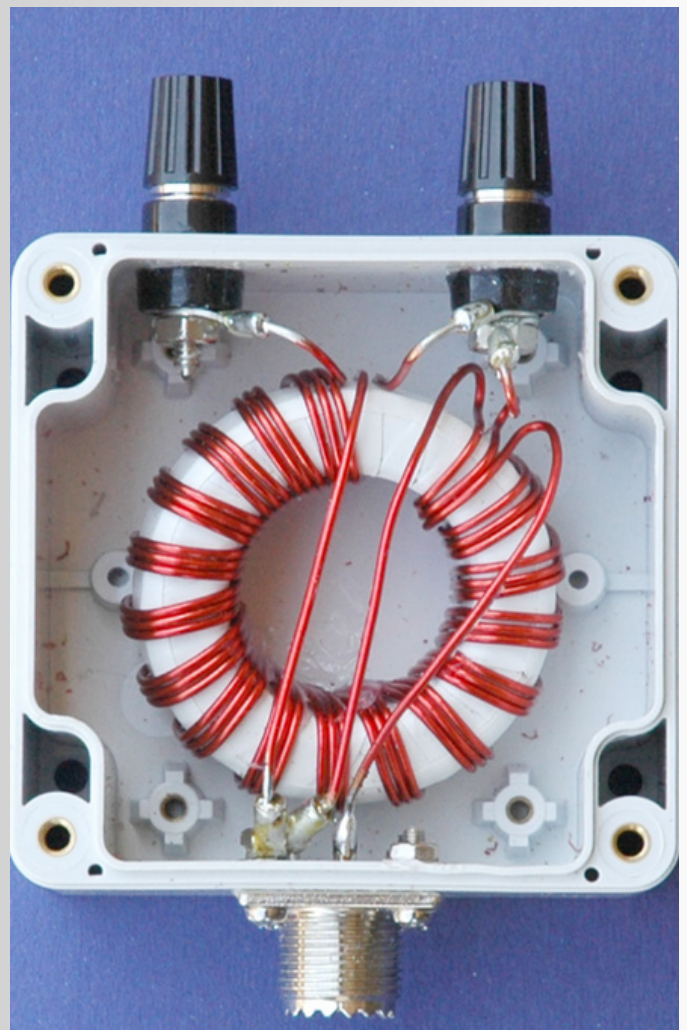


Photo by: vk6sf

FUN WAVE



QSL con humor

-Someone broke into my car...
They saw my Baofeng on the seat.
So they left me three more.

At the hamfest:

—"I love my Baofeng."

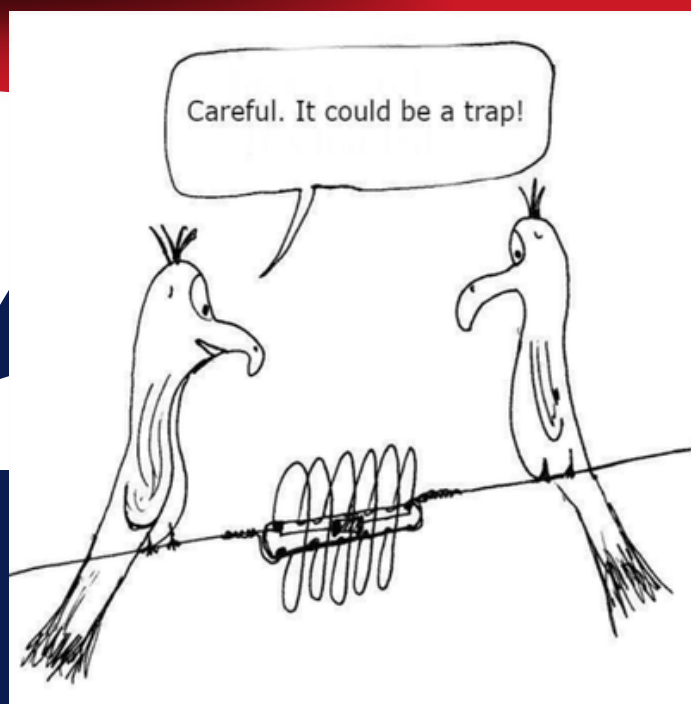
—"Pfft, I only use FT8."

Ten minutes later: antennas swapped,
manuals flying, and two tables gone.

—Old hams don't die... they just improve their
grounding.



Mom, I've already told you—hams aren't
imaginary friends.



In this shack, the only interference is
laughter!

IS THE ELECRAFT KX3 STILL RELEVANT AFTER MORE THAN A DECADE?

From 160 m to 6 m, CW, SSB, AM, FM, and digital modes.

Photo by: swling.com

**COMPACT,
POWERFUL, AGILE**

A classic that remains relevant in the modern HF era.

By: SWR Editorial Team



In its time, the Elecraft K3 stood out as an advanced and versatile transceiver, offering amateur radio operators high-end HF performance with a modular and portable design, at a more accessible cost than other equipment in its class.



Launched in 2012, the Elecraft KX3 has stood the test of time and continues to be a preferred choice for those seeking a high-performance portable transceiver. This modular, compact transceiver has maintained its relevance thanks to its exceptional receiving quality, energy efficiency, and versatility.

Key Features That Keep It Relevant

- **Full Band Coverage:** Operates on all HF bands (160–6 m) and supports CW, SSB, AM, FM, and digital modes, making it ideal for both fixed stations and portable activities.
- **Exceptional Receiving Performance:** Equipped with a high-quality SDR receiver, the KX3 provides excellent filtering and rejection of unwanted signals, even in noisy environments.
- **Energy Efficiency:** With a receive current of less than 150 mA, it's an excellent choice for extended field operations where battery life is crucial.
- **Modularity and Expansion:** Allows the addition of options such as the 100 W KXPA100 amplifier, internal automatic antenna tuner, 2m transverter, and PX3 panadapter, adapting to a variety of operational needs.
- **Intuitive Design:** Its user interface is designed for easy access to key functions without navigating complex menus, enhancing the operator experience.



A high-quality SDR receiver that captures every signal, even in noisy environments.

User and Expert Opinions

Despite its age, the KX3 remains highly regarded by the amateur radio community. According to an analysis by Rob Sherwood, the KX3 continues to rank among the top performers in receiving capability, even when compared to newer and more expensive models.

Users on forums like QRPer.com highlight its performance in contests and DXpeditions, noting that its receiving quality is comparable to high-end transceivers.

Conclusion

The Elecraft KX3 has proven to be a long-lasting investment for amateur radio operators seeking a high-performance portable transceiver. Its combination of advanced features, energy efficiency, and modularity keeps it competitive even against newer models. Whether for field activities or fixed-station use, the KX3 remains a relevant and reliable choice.



EVERY CENTIMETER
COUNTS: ADJUST AND TEST

Photo by: dxavenue.com

Short Antennas, Strong Signals!

By: Julio Mercado WP4PUX

MY ADVENTURE WITH LINEAR LOADING

I had always dreamed of operating on the 80-meter band, but my backyard seemed like an impossible mission—there was no room for a full dipole! My antenna couldn't stretch out like in the manuals, so I had to think outside the box... or rather, outside the yard.

That's when I discovered the technique of linear loading. Unlike traditional coils, where you wind the wire into loops, this method involves adding linear segments along the radiator. It's like "electrically lengthening" the antenna while keeping it physically shorter. Essentially, your antenna becomes smarter without increasing its size.

Linear Loading: Shortening Without Losing Efficiency

At first, I had the wrong idea that all loading coils were the same. But a linear-loaded coil works differently: instead of winding the wire, linear segments are added along the radiator. This increases the antenna's electrical length while keeping it physically short. It's like "tricking the antenna" into thinking it's longer than it actually is.

This technique is very efficient, especially when there isn't enough horizontal space, and it allows for a reasonable bandwidth—much better than simply winding the wire into a coil at the end of the dipole.



Photo: VI3IK

A SHORT ANTENNA DOESN'T NEED TO BE SMALL; IT NEEDS TO BE EFFICIENT.

Advantages of Linear Loading

- Allows the installation of shorter antennas in limited spaces.
- Maintains a reasonable bandwidth.
- Improves efficiency compared to a loading coil placed at the end of the radiator.

My Step-by-Step Process

1. **Measuring Available Space:** Before cutting any wire, I carefully measured my yard and calculated the maximum length I could install without issues.
2. **Antenna Design:** I decided to build a shortened dipole with linear loading distributed along the arms. Each linear segment was calculated to “add” the electrical length needed to resonate at 3.5 MHz.
3. **Construction:** I used copper wire and PVC supports to keep the linear sections firm and organized. It was like assembling a puzzle where every meter counts.
4. **Installation and Tuning:** Once installed, I used my SWR meter to make fine adjustments. Moving a small linear segment just a few centimeters could significantly change the SWR, so patience was key.
5. **Efficiency Testing:** After several measurements and tweaks, I got the antenna to resonate at 3.5 MHz with an acceptable SWR, proving that linear loading is truly effective for limited spaces.

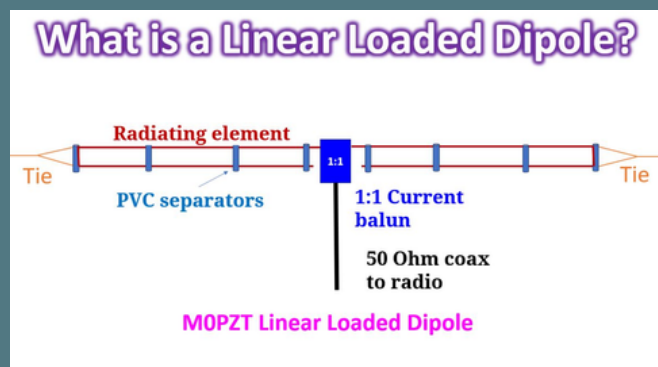


Image by: johnsonfrancis.org

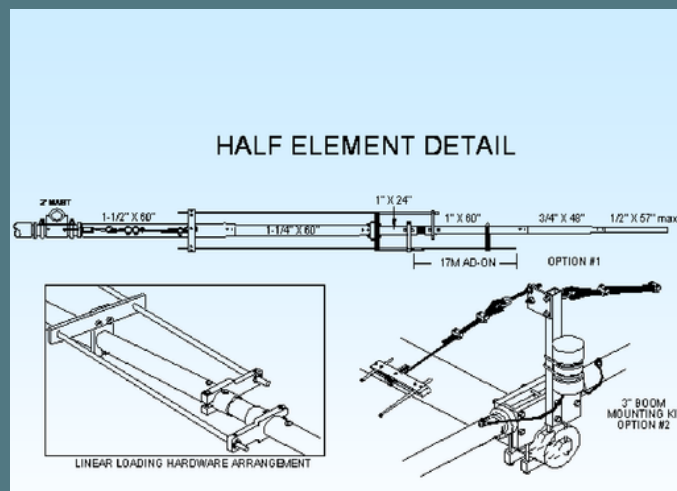


Image by: m2inc

Other Options I Considered

Linear loading isn't the only choice. I also considered:

- **Inverted V Dipoles:** To reduce horizontal space.
- **End-Fed Half-Wave with Inductors:** Ideal for very limited spaces.
- **Slopers:** Angled dipoles that take up less area.
- **Distributed “Rubber Ducky” Loads:** Using inductance along the wire.

Each method has its advantages, but for my space and goals, linear loading was the clear winner.

Lessons Learned

- **Measure Before You Cut:** Every centimeter counts.
- **Be Patient with Tuning:** SWR doesn't lie, but it can take time to settle.
- **Linear Loading Isn't Magic:** It's physics applied correctly.
- **Enjoy the Process:** There's nothing more rewarding than seeing your signal radiate from an antenna that barely fits in your yard.

Conclusion

Shortening an 80-meter antenna doesn't mean giving up efficiency or fun. With linear loading and a bit of creativity, even a small backyard can become an antenna laboratory. Every time I see my signal climb on the SWR meter, I can't help but smile: my antenna is short, but the fun and the signal are huge.

Every signal I send is a bridge to the world.

RADIO ASTRONOMY AS A HOBBY: LISTENING TO THE UNIVERSE FROM HOME

Why Radio Astronomy?

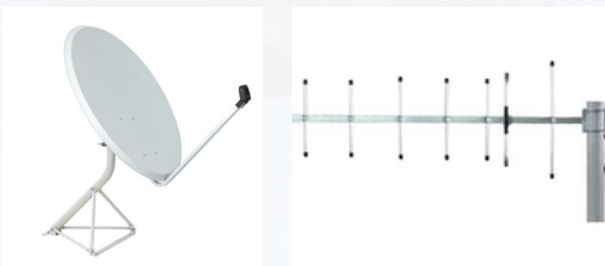
Radio astronomy allows us to study the universe through radio waves, revealing phenomena invisible to the human eye such as pulsars, quasars, and solar emissions. Unlike optical astronomy, it does not require clear skies or expensive telescopes, making it an ideal discipline for hobbyists with a scientific curiosity. Next, we will explore the basic elements that will allow you to engage in simple and enjoyable radio experimentation with space.



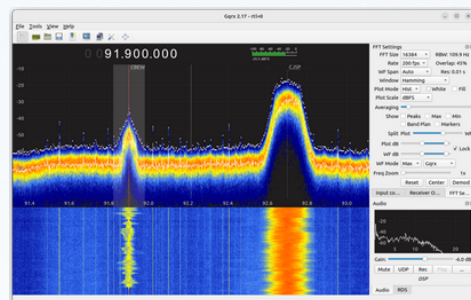
Accessible Equipment for Amateur Radio Astronomy

You can start with affordable and easy-to-find materials:

- Yagi or Parabolic Antenna: can be repurposed from satellite TV systems.



- Computer with Free Software: such as SDR#, GQRX, or RadioEyes.



- SDR Receiver (Software Defined Radio): such as the RTL-SDR, available for under \$30 USD.



- LNA (Low-Noise Amplifier): enhances reception sensitivity.



- LNB (Low Noise Block Downconverter): a device located at the focus of a parabolic antenna that receives high-frequency signals (such as Ku-band), amplifies and filters them, and converts them to a lower intermediate frequency (IF) that can be processed by receivers like an RTL-SDR.



- Power Supply and Coaxial Cables: essential for connecting the entire system.



A practical example is the design of a school solar radio telescope, which uses a parabolic antenna and an SDR receiver to capture emissions from the Sun. However, this type of radio telescope is mainly limited to strong and nearby signals, such as those from the Sun, due to the small antenna size and its modest gain.



Unlike an optical telescope, which can reach very distant objects thanks to its angular resolution, a radio telescope requires a considerable diameter to achieve good sensitivity and spatial resolution. However, this physical limitation is offset by its ability to capture a wide range of frequencies across the electromagnetic spectrum, allowing the study of phenomena invisible to visible light.

What Can I Capture with My Homemade Radio Telescope?

In the following table, we can see the types of signals that can be detected and used for analysis.

Captured signal.	Description	Relevance
Solar emissions.	Intensity variations in the Ku band.	Ideal for school projects and solar tracking Satellites
Geostationary satellites.	TV or data signals.	Useful for calibration and practice.
General galactic noise.	Microwave background or diffuse emissions.	Limited, but possible in low-interference environments

How to Improve the System

If you want to capture deeper signals, such as the hydrogen line, consider:

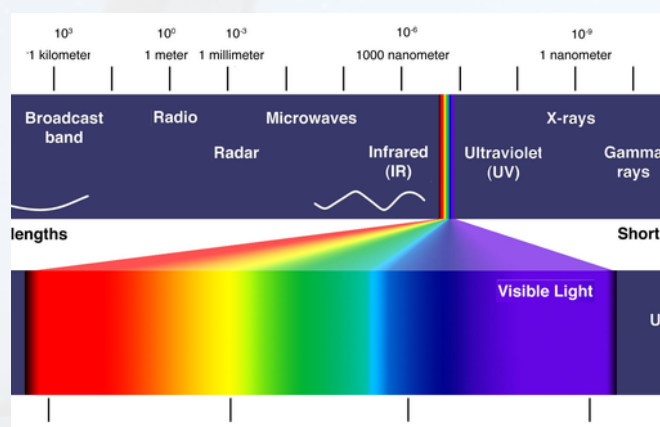
- Using a 3-element Yagi antenna adapted for 1420 MHz.
- Incorporating an LNA specific for the L-band (1–2 GHz).
- You should use software like RadioEyes, GNU Radio, or SDR# with appropriate filters.

What Skills and Key Concepts Can You Learn from This Type of Radio Experiment?

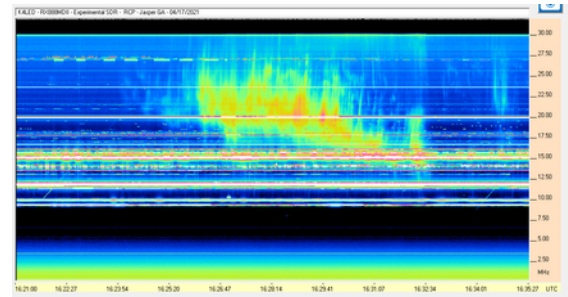
- **Electromagnetic Spectrum:** Understand which frequencies are useful for capturing astronomical signals.
- **Signal Processing:** Learn to filter, visualize, and analyze data using SDR software.
- **Celestial Coordinates and Tracking:** Locate astronomical objects using ephemerides and star maps.
- **Noise and Calibration:** Distinguish real signals from terrestrial interference.

Beginner Projects

- **Capturing Solar Emissions:** Ideal for clear days and simple antennas. Free tools provided by NASA can help you verify what you observe with your homemade radio telescope. Using an RTL-SDR with a DirecTV antenna and its LNB, you can observe intensity variations in SDR# that correspond to solar activity, especially during events like solar flares or changes in solar radiation. These signals often appear as peaks or elevations in the frequency spectrum, typically in the Ku band (11–14 GHz), where the LNB converts the signal to an intermediate frequency (IF) that the SDR can process.
- **Meteor Detection via Radio Reflection:** Using distant radio stations.
- **Satellite and Probe Tracking:** With software like GPredict and updated TLEs.
- **Listening to the Hydrogen Line (21 cm):** More advanced, but possible with well-calibrated homemade antennas at least 1.5 meters in diameter.



What Will You See in SDR?



- **Spectrum with Intensity Peaks:** When the Sun is active, you will see elevations in the signal at certain frequencies, especially if the dish is well aligned.
- **Diurnal Variations:** Even without extreme solar events, the signal can change between morning and afternoon, reflecting the Sun's movement through the antenna's field of view.
- **Thermal Noise and Background:** The Sun emits background noise that can be detected as a general rise in the spectrum.

Recommendations for Better Solar Detection

- **Precise Orientation:** Point the antenna toward the Sun during its highest elevation.
- **Avoid Interference:** Keep the system away from noise sources like routers, microwaves, or power cables.
- **Record at Different Times:** Compare spectra throughout the day to identify variations.
- **Spectrum Peaks or Elevations:** In the intermediate frequency (IF) delivered by the LNB, typically between 950 MHz and 2150 MHz.
- **Intensity Changes:** Occur when moving the antenna or during the Sun's transit.

Hopefully, this gives you an idea of how to build your first radio telescope and start having fun with radio experimentation.

By: Ricardo Cortés
HK3CCR
World Experimental Radio

HAM RADIO ZONE

Connecting the World, One Contact at a Time



Photo by: Merzuke Gediktaş

waves become bridges of friendship and accomplishment. An image that captures the spirit of the CQWW: energy, camaraderie, and the magic of connecting the world with a voice.

In the image, Merzuke Gediktaş immerses himself in the intensity of the CQ WW SSB, focused at his station while the whole world resonates through his headphones. Every call, every exchange, is part of a global symphony of hams united by passion and challenge. Alongside his team, he achieved over 5,900 contacts, proving that when dedication and teamwork combine, radio

Power, Precision, and Passion: The Spirit of ES9C in Action

In the photo, the ES9C team experiences the excitement of the CQ WW SSB 2025, surrounded by antennas, screens, and the unstoppable energy of a group united by the same passion. Amid laughter, strategy, and precision in every call, the operators work as a single mechanism, turning the ether's noise into thousands of contacts around the world. This is the essence of the contest: competitive spirit, friendship without borders, and the power of radio to connect voices from every corner of the planet.

Photo by: YL Marija



NP4Z Ready for the CQWW SSB

In the image, Felipe, NP4Z, prepares for a new adventure to St. Croix, ready to operate the CQ WW SSB from the KP2B station. With his suitcase in hand and a determined gaze, he embodies the tireless spirit of the ham who crosses borders in search of signals, friends, and new experiences on the air. It's the beginning of another story fueled by a passion for radio, where every contact will be a testament to dedication and love for this craft that connects us beyond distance.

Photo: FB Jaime Vazquez (WP3A)

SWR

